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10/724,586	11/28/2003	Christopher M. Bishop	305414.01	9877
22971 7590 04/02/2008 MICROSOFT CORPORATION ONE MICROSOFT WAY REDMOND, WA 98052-6399				
EXAMINER				
SILVER, DAVID				
ART UNIT		PAPER NUMBER		
2128				
NOTIFICATION DATE		DELIVERY MODE		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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### Office Action Summary

**Application No.**

10/724,586

**Applicant(s)**

BISHOP ET AL.

**Examiner**

DAVID SILVER

**Art Unit**

2128

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 December 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6, 8-19, 21-31, 33-44, 46-55, 57-65 and 67-70 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-19, 21-31, 33-44, 46-55, 57-65 and 67-70 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 1/11/08
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. The Instant Office Action is in response to a Request for Continued Examination filed 12/26/2007.
2. Claims 1-6, 8-19, 21-31, 33-44, 46-55, 57-65, and 67-71 are currently pending in Instant Application.

***Priority***

3. Priority is not claimed (**11/28/2003**).

***Information Disclosure Statement***

4. The information disclosure statement(s) (IDS) submitted on 1/11/2008 is/are in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement(s) is/are being considered if signed and initialed by the Examiner.

***Response to Arguments***

***Response: 35 U.S.C. § 101***

**5. Applicants argue:**

- 5.1 "Claim 1 as presently amended recites "a computer implemented method for minimizing effects of outlier data on data modeling." Independent claims 14, 27, 39, 50 and 61 recite similar limitations."  
(Remarks: page 16 - top)
- 5.2 "Further, claim 1 expressly recites "minimizing effects of outlier data on data modeling." *This produces a real-world result, that is, a data model that is robust as to outliers.*" (Remarks: page 16 bottom to page 17 top; emphasis by Examiner)
- 5.3 "The Applicant submits that the claimed invention will substantially produce the same result (i.e., same data model) each time the set of input data is introduced into the claimed invention (assuming all other factors remain the same)."

**6. Examiner Response:**

MPEP 2106.01.1 titled "Computer-Related Nonstatutory Subject Matter [R-6] - 2100 Patentability", recites, in part: "When a computer program is claimed in a process where the computer is executing the computer program's instructions, USPTO personnel should treat the claim as a process claim. \*\* When a computer program is recited in conjunction with a physical structure, such as a computer memory, USPTO personnel should treat the claim as a product claim."

- 6.1 Regarding subsection 1 *supra*, the term "computer implemented method" is in the preamble, which is

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not given patentable weight as it is not required for the life, meaning, and vitality of the claim body.

Further, it is unclear what is meant by "computer implemented". Does this mean that a computer is executing the method, or does it mean that a computer is storing the method as instructions.

Clarification is required. The statutory class of the claimed invention is unknown.

6.2 Regarding subsection 2 *supra*, the emphasized portion does not appear to be grammatically correct.

Specifically, "robust as to outliers" appears improper. Additionally, the quoted portion appears in the preamble and is merely intended use.

6.3 Regarding subsection 3 *supra*, the statement is a conclusionary statement. Furthermore, term "substantially produces the same result" brings into question the concreteness of the claimed invention. This appears to imply that the produced result is not always absolutely consistent given the same input data.

***Response: 35 U.S.C. § 112 P1***

**7. Examiner Response:**

7.1 Applicants argue that "tractable approximation" is expressly thought by the Specification. This is argued as the specification reciting that "tractable approximation may at least be generated using Monte Carlo techniques or variation inference". (Remarks: page 19 top) Merely stating that a tractable approximation may be generated using Monte Carlo techniques is not adequate to provide a full disclosure. Specifically, this statement does not disclose **how** the techniques are used, what algorithms, formulae, steps, etc are used. Additionally, the use of the language "may" does not expressly, clearly, deliberately, and precisely define the term "tractable approximation". In fact, the only disclosure of using Monte Carlo techniques is disclosed in (**Spec: page 9 lines 9-13**) which ends without disclosing how and which techniques are used. Accordingly, for this reason the argument is not persuasive.

7.2 Applicants further argue that "Equations (12), (18), (22), (25), and (28) show how to compute tractable approximations for the following modeling parameters (respectively): labeling parameters, mixing coefficients, mean of a Student distribution, precision matrix of a Student distribution

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component, and scaling parameters." (Remarks: page 19). Such argument is also not persuasive. Specifically, claim language recites: "computing a tractable approximation of a posterior distribution" whereas, the questions pointed to above appear to be related to the limitations of computing a lower bound of a log marginal likelihood, as it would appear from (**Spec: page 9 lines 14-19**) which continues to disclose the above-mentioned equations.

***Response: 35 U.S.C. § 112 P2***

**8. Background:**

8.1 "Claims 1-70 are rejected under 35 U.S.C. § 112P2 as being indefinite for allegedly failing to particularly point out and distinctly claim the subject matter of the invention. The Office Action states that the term "tractable" is relative and ambiguous, and therefore renders the claims indefinite." (Remarks: page 20)

**9. Applicants argue:**

9.1 "As recited above, the instant specification clearly defines "tractable." The Applicant expressly teaches in the specification that a tractable approximation may at least be generated using Monte Carlo techniques or variational inference (e.g., page 9, lines 13-14; page 18, lines 4-5). Also, a tractable approximation using a variational inference is described in detail on at least pages 9-14 of the specification. Furthermore, Applicant respectfully asserts that the term "tractable" is well known to one of ordinary skill in the art." (Remarks: page 20)

**10. Examiner Response:**

10.1 The term tractable means: easily managed (controlled or taught or molded); readily reacting to suggestions and influences (Source: [wordnet.princeton.edu/perl/webwn](http://wordnet.princeton.edu/perl/webwn))

The term is clearly relative as the emphasized portions that are used in the definition of the term are relative. The Specification does *not* provide a definition that is clear, deliberate, and precise. The Monte Carlo techniques / variation inference are not adequate to limit the term to a particular explicit definition that is not relative.

***Response: 35 U.S.C. § 102***

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**11. Examiner Response:**

Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Regarding statements on page 23 bottom to page 24 arguing claim 2, as admitted by Applicants, Heckerman iterates through nodes to adjust a test network. When the iteration through nodes takes place, the parameters (probabilities) for each of the nodes are used (**col: 6 line: 29-31**). Accordingly, the iteration through "nodes" is iterating through the parameters (probabilities) which correspond to the nodes.

***Claim Objections***

12. Claim 71 is objected to under 37 CFR 1.75(c), as being of **improper dependent form** for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Specifically, patentable weight is not given to claim 71's limitation as it discloses merely non-functional descriptive material.

When "non functional descriptive material" is recorded or stored in a memory or other medium (i.e., substrate) it is treated as analogous to printed matter cases where what is printed on a substrate bears no functional relationship to the substrate and is given no patentable weight. See *In re Gulack*, 703 F.2d 1381, 1385 (Fed. Cir. 1983) ("Where the printed matter is not functionally related to the substrate, the printed matter will not distinguish the invention from the prior art in terms of patentability. Although the printed matter must be considered, in that situation it may not be entitled to patentable weight."). Patentable weight is not given to descriptive material absent a new and unobvious functional relationship between the descriptive material and the substrate. See *In re Lowry*, 32 F.3d 1579, 1582-83 (Fed. Cir. 1994); *In re Ngai*, 367 F.3d 1336, 1338 (Fed. Cir. 2004). The "observed data" (input set) constitutes non-functional descriptive material. In other words, the steps of the parent claim do not change their functions based upon the content of the input set. Because the data bears no functional relationship to the substrate (i.e., the input set), this claim

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limitation is not accorded patentable weight as non-functional descriptive material.

***Claim Rejections - 35 USC § 101***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

13. Claims 1-6, 8-19, 21-31, 33-44, 46-55, 57-65, and 67-71 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

"The claimed invention as a whole must >be useful and < accomplish a practical application. That is, it must produce a "useful, concrete and tangible result." State Street, 149 F.3d at \*1373-74<, 47 USPQ2d at 1601-02. The purpose of this requirement is to limit patent protection to inventions that possess a certain level of "real world" value, as opposed to subject matter that represents nothing more than an idea or concept, or is simply a starting point for future investigation or research (Brenner v. Manson, 383 U.S. 519, 528-36, 148 USPQ 689, 693-96 \*\*> (1966); In re Fisher, 421 F.3d 1365, 76 USPQ2d 1225 (Fed. Cir. 2005); In re Ziegler, 992 F.2d 1197, 1200-03, 26 USPQ2d 1600, 1603-06 (Fed. Cir. 1993))." (MPEP 2106)

The claimed invention lacks a real-world practical application. Thus, it is drawn to non-statutory subject matter. See MPEP 2106 (relevant portion cited above). Applicants are claiming a method of computing, which is merely a concept without a real world value. The claimed invention of computing approximation of a posterior distribution is not applied in a practical manner which provides a real-world value, rather, it represents nothing more than an idea of performing an abstract manipulation of mathematical constructs.

***Claim Rejections - 35 USC § 112***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

14. Claims 1-6, 8-19, 21-31, 33-44, 46-55, 57-65, and 67-71 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the **written description requirement**. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

As per claims 1-70, the Specification does not explain what makes an approximation "tractable". How is a "tractable" approximation performed? Furthermore, the Specification does not define what makes an approximation tractable (easily managed).

15. Claims 1-6, 8-19, 21-31, 33-44, 46-55, 57-65, and 67-71 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject

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matter which applicant regards as the invention.

As per claims 1-70, the term "tractable" is defined as:

"tractable adj. 1. Easily managed or controlled; governable. 2. Easily handled or worked; malleable." (Source: <http://www.answers.com/tractable&r=67>).

The term is relative and ambiguous. The term renders the claim indefinite.

16. Claims not specifically mentioned are rejected by virtue of dependency.

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

17. Claims 1-6, 8-11, 14-19, 21-24, 27-31, 33-36, and 39-44, 46-55, 57-65, 67-71 are rejected under 35

U.S.C. 103(a) as being unpatentable over Heckerman (**US 5,704,018**), in view Friggens (**US 20040098207 A1**).

Heckerman discloses: 1. A method comprising:

selecting a modeling parameter from a plurality of modeling parameters characterizing a mixture of Student distribution components (**col: 7 line: 42-56; student distribution ... col: 16 line: 6-37 (emphasis on 34-37))**;

computing a tractable approximation for the selected modeling parameter based on an input set of data and a current estimate of a posterior distribution of at least one unselected modeling parameter in the plurality of modeling parameters (**col: 7 line: 14-27; col: 8 line: 43-49; col: 10 line: 57-67 - admitted by Applicants in Remarks dated 12/26/2007 page 22 paragraph 2 sentence 1**);

computing a lower bound of a log marginal likelihood as a function of current estimates of the posterior distributions of the modeling parameters, the current estimates of the posterior distributions of the modeling parameters including the computed tractable approximation of the posterior distribution of the selected modeling parameter (**col: 11 line: 12-17; col: 10 line: 5-30**);

determining if the lower bound has been satisfactorily optimized, wherein the lower bound is



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satisfactorily optimized when the computer lower bound has changed less than a threshold amount from a previous computed lower bound (**col: 6 line: 36-47**); generating a probability density modeling the input set of data, the probability density including the mixture of Student distribution components, the mixture of Student distribution components being characterized by the current estimates of the posterior distributions of the modeling parameters, if the lower bound is satisfactorily optimized; outputting the probability density (**col: 2 line: 5-23; col: 7 line: 14-27**).

Heckerman however does not expressly disclose computing a tractable approximation of a posterior distribution for the selected modeling.

Friggens however discloses an analogous prediction statistical analysis (**para 22**) system and method having the said feature (**para 115**).

It would have been obvious to approximate a posterior distribution instead of the approximation of the actual modeling parameters in order to determine the amount of noise on a particular signal (**Friggens: para 130**) to thereby determine the quality of the signal.

Heckerman discloses: 2. The method of claim 1 wherein the computing operations comprise a first iteration and further comprising:

selecting a different modeling parameter from the plurality of modeling parameters and repeating in a subsequent iteration the operations of computing a tractable approximation and computing a lower bound using the newly selected modeling parameter, if the lower bound is not satisfactorily optimized in the first iteration(**col: 6 line: 32-56 with emphasis on line: 36-51**).

Heckerman discloses: 3. The method of claim 1 wherein computing a lower bound comprises:

computing the lower bound of the log marginal likelihood as a function of prior distributions of the modeling parameters (**col: 4 line: 39-56; Fig 4, 5, 6 and descriptions; col: 5 line: 33-51**).

Heckerman discloses: 4. The method of claim 1 wherein computing a tractable approximation of a

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posterior distribution comprises:

computing a variational approximation of the posterior distribution of the selected modeling parameter **(col: 13 line: 30-65 with emphasis on 45-56)**.

Heckerman discloses: 5. The method of claim 1 wherein one of the plurality of modeling parameters represents a mean of each of the Student distribution components **(col: 7 line: 65-67 "average"; col: 10 line: 48-49; col: 7 line: 56-65)**.

Heckerman discloses: 6. The method of claim 1 wherein one of the plurality of modeling parameters represents a precision matrix of the Student distribution components **(col: 13 line: 65 to col: 14 line: 25; Fig 9A and 9B and their descriptions; col: 14 line: 26-64)**.

Heckerman discloses: 8. The method of claim 1 wherein one of the plurality of modeling parameters represents a scaling parameter of a precision matrix of the Student distribution components **(col: 18 line: 31-49 scaling parameter ... "weights")**.

Heckerman discloses: 9. The method of claim 1 wherein one of the plurality of modeling parameters represents a mixing coefficients parameter of the Student distribution components **(col: 16 line: 58 to col: 17 line: 2; col: 16 line: 47-56; col: 7 line: 1-20)**.

Heckerman discloses: 10. The method of claim 1 wherein generating a probability density comprises:  
generating the probability density including the mixture of Student distribution components, the mixture of Student distribution components being characterized by the current estimates of the posterior distributions of the modeling parameters and an estimate of the number of degrees of freedom of each Student distribution component **(this is an inherent features of the cited reference's distribution)**.

Heckerman discloses: 11. The method of claim 1 further comprising:

storing the current estimates of the posterior distributions of the modeling parameters in a storage location **(Fig 8B item 820; Fig 6 and its description)**.

As per claims 14-19, 21-24, 27-31, 33-36, and 39-44, 46-55, 57-65, 67-70, note the rejection of claims 1-6, 8-11 above. The Instant Claims recite substantially same limitations as the above-rejected claims and

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therefore rejected under same prior-art teachings.

Heckerman discloses: 71. The method of claim 1 wherein the input set of data includes only observed data (**See Claim Objection section above; col: 3 line: 29-33**).

18. Claims 12-13, 25-26, and 37-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Heckerman (**US 5,704,018**) as applied to claim 1 above, in view Friggens (**US 20040098207 A1**), and further in view of Official Notice taken.

As per claim 12, Heckerman discloses all limitations of claim 1. Heckerman however does not expressly disclose that the input set of data represents auditory speech data from an unknown number of speakers. Official Notice is taken with respect to this limitation. It would have been obvious to one of ordinary skill in the art <digital signal processing / statistical analysis> at the time of Applicant's invention to combine the features in order to apply the features taught by Heckerman in order to use them on digital signal processing systems such as sound or image processing in order to *efficiently and quickly process the digital signals*. Furthermore, having knowledge of the number of speakers is useful in speech recognition. One would be motivated to know the number of speakers in a conference in order to transcribe the presentations and feedback questions through computer automated methods. See, for example, Rajan (**US 20020055913 A1**).

As per claim 13, Heckerman discloses all limitations of claim 1. Heckerman however does not expressly disclose that the input set of data represents image segmentation data from images. Official Notice is taken with respect to this limitation. It would have been obvious to one of ordinary skill in the art <digital signal processing / statistical analysis> at the time of Applicant's invention to combine the references in order to apply the features taught by Heckerman in order to use them on digital signal processing systems such as sound or image processing in order to efficiently and quickly process the digital signals.

As per claims 25-26, note the rejection of claims 12-13 above. The Instant Claims recite(s) substantially same limitations as the above-rejected claims and therefore rejected under same prior-art teachings.

As per claims 37-38, note the rejection of claims 12-13 above. The Instant Claims recite(s) substantially same limitations as the above-rejected claims and therefore rejected under same prior-art teachings.

***Support for Amendments and Newly Added Claims***

19. Applicants are respectfully requested, in the event of an amendment to claims or submission of new claims, that such claims and their limitations be directly mapped to the specification, which provides support for the subject matter. This will assist in expediting compact prosecution. MPEP 714.02 recites: "Applicant should also specifically point out the support for any amendments made to the disclosure. See MPEP § 2163.06. An amendment which does not comply with the provisions of 37 CFR 1.121(b), (c), (d), and (h) may be held not fully responsive. See MPEP § 714." **Amendments not pointing to specific support in the disclosure may be deemed as not complying with provisions of 37 C.F.R. 1.131(b), (c), (d), and (h) and therefore held not fully responsive.** Generic statements such as "Applicants believe no new matter has been introduced" may be deemed insufficient.

***Requests for Interview***

20. In accordance with 37 CFR 1.133(a)(3), requests for interview must be made in advance.
- 20.1 Interview requests are to be made by telephone (571-272-8634) call or FAX (571-273-8634).
- 20.2 Applicants must provide a detailed agenda as to what will be discussed (generic statement such as "discuss §102 rejection" or "discuss rejections of claims 1-3" may be denied interview).
- 20.3 The detail agenda along with any proposed amendments is to be written on a PTOL-413A or a custom form and should be faxed (or emailed, subject to MPEP 713.01.I / MPEP 502.03) to the Examiner at least 3 days prior to the scheduled interview.
21. Interview requests submitted within amendments may be denied because the Examiner was not notified, in advance, of the Applicant Initiated Interview Request and due to time constraints may not be able to review the interview request to prior to the mailing of the next Office Action.

***Conclusion***

All claims are rejected.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should

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be directed to David Silver whose telephone number is (571) 272-8634. The examiner can normally be reached on Monday thru Friday, 10am to 6:30pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on 571-272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/ DS /  
David Silver, Patent Examiner  
Art Unit 2128

/Kamini S Shah/  
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